 PUBLIC VERSION

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of Petition of WorldCom, Inc. Pursuant To Section 252 (e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia, Inc., and for Expedited Arbitration	)	CC Docket No. 00-218
In the Matter of Petition of Cox Virginia Telecom, Inc. Pursuant to Section 252 (e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia, Inc. and for Arbitration	)	CC Docket No. 00-249
In the Matter of Petition of AT&T Communications Virginia Inc., Pursuant to Section 252 (e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia Corporate Commission Regarding Interconnection Disputes with Verizon Virginia, Inc.	)	CC Docket No. 00-251

REBUTTAL TESTIMONY OF MICHAEL R. BARANOWSKI, TERRY L. MURRAY, CATHERINE E. PITTS, JOSEPH P. RIOLO AND STEVEN E. TURNER

ON BEHALF OF AT&T AND WORLDCOM, INC.

August 27, 2001

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I. INTRODUCTION AND SUMMARY

Q. WHO ARE THE MEMBERS OF THE WITNESS PANEL SPONSORING THIS TESTIMONY?

A. The members of this panel are Michael R. Baranowski, Terry L. Murray, Catherine E. Pitts, Joseph P. Riolo and Steven E. Turner.

Q. WHAT ROLE DID EACH MEMBER OF THIS PANEL PLAY IN THE PREPARATION OF THIS TESTIMONY AND THE ASSOCIATED STUDIES?

A. Although all members of this Panel have reviewed and support this testimony, each Panel member assumed primary responsibility for specific segments of the testimony. Each Panel member relies on the facts and analyses developed by the other Panel members in their areas of primary responsibility. Specifically:

(1) Michael R. Baranowski addresses Verizon's testimony concerning the recurring costs associated with loops.

(2) Terry L. Murray addresses Verizon's testimony concerning the costs associated with Operations Support Systems.

(3) Catherine E. Pitts addresses Verizon's testimony concerning the recurring costs associated with unbundled local switching.

(4) Joseph P. Riolo addresses Verizon's testimony concerning network construct and technology assumptions for the recurring cost studies.

(5) Steven E. Turner addresses Verizon's testimony concerning the recurring costs associated with transport.

Q. ARE YOU THE SAME TERRY L. MURRAY, CATHERINE E. PITTS, JOSEPH P. RIOLO AND STEVEN E. TURNER WHO SUBMITTED DIRECT TESTIMONY IN THIS PROCEEDING ON JULY 31, 2001?

A. Yes, we are.

Q. DID YOUR DIRECT TESTIMONY CONTAIN A DESCRIPTION OF YOUR BACKGROUND AND EXPERIENCE?

A. Yes, it did.

Q. MR. BARANOWSKI, PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Michael R. Baranowski. I am Managing Director of FTI Klick, Kent & Allen, Inc., a subsidiary of FTI Consulting, Inc. ("FTI/KKA"). FTI/KKA is an economic and financial consulting firm with offices at 66 Canal Center Plaza, Suite 670, Alexandria, Virginia 22314.

Q. MR. BARANOWSKI, PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL EXPERIENCE.

A. After receiving a Bachelor of Science in Accounting from Fairfield University in 1980, I joined the consulting firm of Wyer, Dick and Company in Livingston, New Jersey. Since that time, I have been continuously involved in cost analyses, including analyses of short-run and long-run marginal costs, short-run and long-run incremental costs, and stand-alone costs for a variety of industries. These studies often employ complex, computer-driven models that rely upon detailed engineering input data and sophisticated discounted-cash-flow techniques. The results of many of these studies have been submitted in administrative proceedings, in court, and in arbitrations. Since 1996, I have been assisting

AT&T, WorldCom, and other CLEC's in analyzing cost evidence submitted in various proceedings arising out of the Telecommunications Act of 1996.

Q. MR. BARANOWSKI, PLEASE SUMMARIZE YOUR RECENT TELECOMMUNICATIONS EXPERIENCE THAT IS RELEVANT TO THIS PROCEEDING.

A. I have been either directly or indirectly involved in the presentation of forward-looking economic costs for unbundled network elements ("UNE's") in a number of jurisdictions, including Colorado, the District of Columbia, Idaho, Iowa, Maryland, Minnesota, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Oregon, South Dakota, Texas, Washington, and Wyoming. We have participated in Universal Service Fund proceedings in Alabama, Colorado, Florida, Georgia, Minnesota, Montana, New Mexico, North Carolina, South Carolina, and Washington. I also have been directly involved in critiques of cost studies submitted by Verizon/Bell Atlantic in Delaware, the District of Columbia, Maryland, Massachusetts, New York, New Jersey, Pennsylvania, Virginia, and West Virginia. I also have been either directly or indirectly involved in critiques of cost studies presented by GTE in California, Iowa, Minnesota, Nebraska, New Mexico, Oregon, Texas, and Washington; submitted testimony in Texas on Southwestern Bell's cost studies; and critiqued the Benchmark Cost Proxy Model ("BCPM") in numerous states. Finally, I have assisted AT&T and WorldCom/MCI in developing a methodology to be used to determine forward-looking costs for collocation, which was presented in the states of Alabama, Florida, Georgia, Louisiana, Maryland, Minnesota, New York, North Carolina, and Tennessee. I submitted testimony on the AT&T/MCI Collocation Cost Model

in Pennsylvania. I also was personally involved on behalf of both AT&T and WorldCom/MCI in the initial Virginia UNE proceeding (Case PUC 970005) before the Virginia State Corporation Commission ("SCC"). I am intimately familiar with both the cost studies submitted by BA-VA (now Verizon Virginia) in that proceeding and the shortcomings of those studies identified by the SCC.

I also have had relevant experience in other "network industries," including the railroad, pipeline, and trucking industries.

Q. WHAT IS THE PURPOSE OF THIS PANEL'S TESTIMONY?

A. We have been asked by AT&T[1] and WorldCom to review the cost models submitted on July 2, 2001 by Verizon Virginia ("Verizon")[2] in this proceeding relevant to recurring charges, to identify violations of the FCC's TELRIC costing principles, and, where practical, to correct and restate the Verizon cost study results. In addition, we have been asked to review and respond to certain issues raised in the Panel direct testimony of Verizon's witnesses Donald Albert, Ralph Curbelo, Joseph Gansert, Nancy Matt, Louis Minion, Carlo M. Peduto II, Gary Sanford, and John White (hereinafter "Verizon Panel Direct").

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1 The AT&T entities sponsoring this Direct Testimony are AT&T Communications of Virginia, Inc., TCG Virginia, Inc., ACC National Telecom Corp., MediaOne of Virginia and MediaOne Telecommunications of Virginia, Inc. (together, "AT&T").

2 Throughout this testimony, we will refer to Verizon-Virginia simply as Verizon, except where necessary to distinguish it from other Verizon entities.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. Based on our detailed review of the Verizon Virginia cost studies, we conclude that those studies suffer a number of violations of TELRIC principles which in combination, produce grossly overstated UNE recurring rates. These TELRIC violations range in scope from a blind acceptance of the embedded outside plant network configuration[3] to the use of utilization factors that are far too low. In essence, Verizon's cost study reproduces much of Verizon's own embedded network and thus depriving the network of efficiencies available under properly developed forward-looking TELRIC costs. In addition, the studies suffer a number of logic flaws that result in overstated UNE costs. Correcting these TELRIC violations and logic flaws where possible[4] and restating the Verizon cost studies produces forward-looking rates for UNEs that are far more realistic and will more likely result in robust and long overdue competition for local telephone service in Virginia.

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[3] *See* Shelanski Direct at 6.

[4] As we describe in more detail below, certain of the flaws in Verizon's study cannot be remedied because of access limitations within the cost study models and lack of sufficiently detailed data. Thus, even our restated Verizon rates are, by definition, not TELRIC.

To demonstrate the amount by which Verizon's proposed rates are overstated, Table 1 compares Verizon's proposed UNE rates for a number of key elements to the AT&T/WorldCom restated results supported in this panel testimony and that of other AT&T/WorldCom witnesses. A complete summary of all of the AT&T/WorldCom restated recurring rates is included as Attachment 1 to this testimony.[5]

Table 1

Summary of Restatement of Key Unbundled Network Elements

Element	Verizon	AT&T/WCOM Restated Verizon	% Verizon Overstated
2-Wire Loop Dens Cell 1	$19.49	$5.13	280%
2-Wire Loop Dens Cell 2	$29.69	$7.54	294%
2-Wire Loop Dens Cell 3	$48.93	$12.07	305%
2-Wire Loop Statewide	$25.12	$6.46	289%
Switch Usage - Originating	$0.002703	$0.000111	2,335%
Switch Usage – Terminating	$0.002374	$0.000099	2,298%
Switch Port	$3.15	$1.19	165%
Common Transport (Fixed)	$0.000099	$0.000055	80%
Common Transport (Per Mile)	$0.000002	$0.000001	100%

In addition to substantially exceeding properly developed TELRIC costs, the UNE rates proposed by Verizon far exceed the proxy rates established by the FCC in the first UNE proceeding.

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[5] Workpapers supporting our restatement of Verizon's recurring costs are being provided (footnote continued)

II. VERIZON COST MODEL OVERVIEW

Q. PLEASE BRIEFLY DESCRIBE THE VERIZON COST STUDY.

A. Verizon's loop cost study consists of a series of computer applications bundled within an Oracle software-based interface. Loop costs are processed through a loop cost analysis model ("LCAM"), which is an amalgam of multiple programming modules. A brief description of each module is set forth below.[6]

Plant Characteristics Module: This module uses preloaded information from an old survey conducted by Verizon engineers to produce average feeder and distribution loop lengths and typical cable sizes for each wire center. Cable material and labor cost inputs to the Plant Characteristics Module are based on a separate Verizon system named the Vintage Retirement Unit Cost ("VRUC") system, which Verizon asserts contains installed cable costs from projects undertaken by Verizon from 1997 through 1999.

Electronics Module: The electronics module develops investment costs for Next Generation Digital Loop Carrier ("NGDLC") hardware and common equipment for transmission of the voice grade signal over fiber facilities. Fiber feeder facilities provisioned with NGDLC are placed when the feeder loop length exceeds certain thresholds. For Verizon's cost study, the threshold is **[Begin**

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electronically on a CD filed with this testimony.

[6] These Verizon cost models develop certain of the UNE costs based on unit costs from Maryland instead of Virginia. Verizon provides no explanation of why Maryland unit costs are used. We have, in our restatement of Verizon's cost, changed these UNE to reflect Virginia unit costs.

Verizon Proprietary] * [End Verizon Proprietary].** The electronics module sizes electronic equipment for each Verizon customer serving area based on the number of working lines reported by Verizon.

Loop Study Module: This module reads and summarizes the results of the Plant Characteristics and Electronics modules to produce the loop investment by wire center. The loop study module then combines the loop investment for each wire center with annual cost factor outputs that are generated by a separate Verizon model named the "VCost" Model. The cost results are then weighted by working lines to produce monthly recurring loop rates.

Q. WHAT IS THE VCOST MODEL?

A. The VCost model is a spreadsheet-based application run under the Oracle interface. It was developed by Verizon to produce annual cost factors ("ACFs") that are used to convert investments to annual costs, which are in turn converted to monthly costs by dividing by twelve.

Q. WHAT ACFS DOES VCOST PRODUCE?

A. VCost produces ACFs for depreciation, return on investment, income and property taxes, network operations expenses, support expenses, and miscellaneous marketing and administrative expenses.

Q. PLEASE PROVIDE AN OVERVIEW OF THE ORGANIZATION OF THE VERIZON COMPUTERIZED STUDY MODELS AND MODULES.

A. The Verizon cost programs are controlled by an Oracle software interface that allows analysts to modify certain of the inputs and assumptions within each of the program modules. The interface is difficult and cumbersome to work with and,

more importantly, the interface limits the ability of the analyst to trace the impact of changes to key cost model inputs.

Q. CAN YOU PROVIDE AN EXAMPLE OF THE DIFFICULTIES ASSOCIATED WITH ANALYZING THE VERIZON MODELS?

A. Yes. After the models are installed and properly functioning,[7] considerable effort is required to understand how the models interact within the interface and what inputs and assumptions drive the model results. Unlike a standard spreadsheet application that allows a user to simply highlight a cell and observe a specific formula, the Oracle interface for LCAM is not so transparent to users. It displays only a list of formulas within a given module of the program, without the ability to edit the formulas or to see the corresponding values that are calculated. In order to review a formula, the user must first locate the program variable name assigned to that component and then search for the formula. In most cases, the formulas themselves also include defined variable names, making tracing through the programs a time-consuming endeavor.[8] Further, because of other limitations imposed by the Oracle interface, intermediate model run results can be reviewed only at certain stages of the model run process.

In addition, while the model allows the user to edit formulas or to create new formulas in the individual modules, it has to be done through a special

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[7] Because the Verizon models are written in an older version of Oracle, a number of unorthodox procedures are necessary to get the models installed and running.

[8] Further complicating evaluation of the models is the fact that the Oracle interface restricts the user's ability to review multiple formulas simultaneously, making it more difficult to understand the flow of information throughout the process.

process within the interface. This process is also time-consuming and cumbersome, especially when multiple formulas need to be edited.[9]

Q. HAVE THE DIFFICULTIES THAT YOU ENCOUNTERED HINDERED YOUR ABILITY TO EFFECTIVELY EVALUATE THE MODEL?

A. Yes. The cumbersome process of editing formulas combined with the inability readily to modify multiple formulas makes evaluating the integrity of the model more difficult. While we have been able to find important errors in Verizon's model, there may be others that we have been unable to discern as a result of the cumbersome nature of the Oracle interface.

III. VERIZON'S LOOP COSTS

Q. FOR WHICH TYPES OF LOOPS DOES VERIZON COMPUTES COSTS?

A. Verizon uses the loop cost model to compute costs for several different types of loops, as described in the Verizon Panel testimony.[10] They are as follows:

- Two- and four-wire loops;
- Off-premises extension unbundled loops;
- ISDN/BRI (two-wire digital loops);
- Digital four-wire (56 and 64 Kbps) loops;
- Two- and four-wire customer-specified signaling loops;

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[9] During our review of the Verizon model, we identified a number of small calculation errors in the Verizon model formulas. These errors, which we have corrected, produced a slight overstatement of loop costs. Details of the errors and our corrections are included in our electronic workpapers.

- DS1/ISDN PRI loops;
- DS3 (high capacity) loops;
- XDSL-compatible loops
- Subloops; and
- Dark fiber loops.

Q. DOES YOUR ANALYSIS FOCUS ON ALL OF THE VARIOUS LOOP COSTS COMPUTED BY VERIZON?

A. Our analysis focuses primarily on Verizon's calculations of its two-wire loop costs. While I have also reviewed and restated certain of Verizon's advanced services loop and other proposed costs, because of limited access to Verizon discovery data and the difficulties working with Verizon's model that we described previously, we believe that our restatement falls short of producing the correct forward-looking costs of those services. In other words, our restated costs for advanced loops and other services are still overstated, although not as grossly as the costs initially presented by Verizon.[11]

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[10] Verizon Direct Panel Testimony at 80.

[11] Our analysis and restatement of Verizon's DS3, DS3 Subloop and High Capacity Loops were further hindered because Verizon produced electronic documentation for these elements as image files, void of any calculations. On August 22, more than 50 days after submitting its cost studies, Verizon provided one of these studies in a usable spreadsheet format. Response to AT&T/WorldCom #6-12.

A. ENGINEERING SURVEY

Q. IS VERIZON'S COST STUDY GROUNDED IN APPROPRIATE FORWARD-LOOKING ASSUMPTIONS FOR OUTSIDE PLANT INVESTMENT?

A. No. Verizon's "forward-looking" outside plant is actually based on a survey of its embedded network conducted by its outside plant engineers in the early 1990's. That survey data are then matched with more current information on the number of working lines within each customer serving area. Because they are based on the embedded plant construct, the Verizon "forward-looking" costs are not forward-looking at all. Rather, by relying on existing feeder and distribution routes and its embedded assignment of customers to existing distribution areas, Verizon has failed to recognize any meaningful efficiencies that would be available to a new entrant under the scorched-node environment contemplated by TELRIC. Simply put, relying on an embedded network configuration overstates costs.

Q. WHAT EVIDENCE IS THERE DEMONSTRATING THAT VERIZON RELIES ON ITS EMBEDDED NETWORK?

- A. The outside plant engineering surveys, **[Begin Verizon Proprietary] *** [End Verizon Proprietary]**

Thus, the cornerstone of Verizon's forward-looking outside plant is its embedded plant.

Q. IS THERE OTHER EVIDENCE THAT VERIZON'S FORWARD-LOOKING OUTSIDE PLANT IS REALLY ITS EMBEDDED PLANT?

A. Yes. Verizon itself readily acknowledges that its forward-looking outside plant is based on its embedded network. In a handout distributed by Verizon during its August 22, 2001 cost model demonstration meeting with the FCC, Verizon openly acknowledges that the LCAM is "an application designed to develop loop costs based on the framework of an actual network." For its cost study, the actual network forming the framework for the LCAM is Verizon's own Virginia embedded network.

Q. DOES VERIZON EVEN ACCURATELY CAPTURE THE COSTS OF ITS EMBEDDED PLANT?

A. Probably not. According to the survey instruction materials produced by Verizon in discovery, **[Begin Verizon Proprietary] *** [End Verizon Proprietary]** As a result, the survey results likely do not accurately capture the characteristics of the embedded plant structure.

Q. WHY DOES IT MATTER THAT VERIZON HAS BASED ITS LOOP COST STUDY ON LOOP LENGTH INFORMATION FROM ITS EMBEDDED NETWORK?

A. Basing a loop cost study on embedded base information violates TELRIC principles and simply does not make sense for a least-cost network configuration that an efficient, competitive company would build today. For example, engineers typically construct underground conduit systems along no-cost public rights-of-way adjacent to or within roadway rights-of-way. If a large tract of land was undeveloped 25 years ago, when Verizon engineered its feeder route, it might have placed conduit around the perimeter of the tract. Today, roadways lace that

tract of land, and an efficient company would place conduit using a shorter distance – along the roadways that cross the tract.

Q. HAS VERIZON DEMONSTRATED THAT ITS EXISTING ROUTE CONFIGURATION IS THE MOST EFFICIENT ROUTE CONFIGURATION?

A. No. Verizon has offered no evidence whatsoever that the loop lengths and amount of outside plant that underlie its cost study reflect an efficient, forward-looking network. We asked Verizon in discovery to provide copies of all documents relating to the survey of outside plant characteristics. In response, Verizon provided only a copy of the instructions to the survey engineers.[12] Verizon did not provide key source documents relied upon by survey engineers such as plats, network diagrams, customer location information, maps, or other materials necessary to effectively determine if the embedded network is the appropriate starting point for the forward-looking network design. We were thus unable to determine if the route configuration included in the survey data represents the most efficient, forward-looking routing. While we believe that Verizon's reliance on its embedded network produces overstated loop costs, there is no way to quantify the level of this overstatement without the requested information.

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[12] Verizon Response to Request AT&T/WCOM #1-34.

Q. HAVE YOU ADJUSTED VERIZON'S LOOPS COSTS AS A RESULT OF ITS RELIANCE ON ITS EXISTING ROUTE CONFIGURATION?

A. No. Because there is no way to quantify the extent to which Verizon has overstated costs as a result of its reliance on its existing route configuration, we have not included any such adjustment in our restatement of loop costs – even though a significant downward adjustment is almost certainly warranted. Of course, the impossibility of properly adjusting Verizon's cost model to account for its reliance on its existing route configuration is one reason that the Commission should not rely on that model but instead should reject Verizon's cost model entirely.

Q. ARE THERE ANY OTHER WAYS IN WHICH VERIZON'S USE OF ITS EMBEDDED NETWORK LIKELY OVERSTATES LOOP COSTS?

A. Yes. Verizon's method matches current working line count information by customer service area ("CSA") and distribution area ("DA") with the survey data and uses that information to model the size and type of digital loop carrier electronics and the size of distribution plant cable. The working line counts are also aggregated by wire center and used to weight loop costs by density zone. By matching working lines with survey data instead of looking at actual customer locations, Verizon's approach virtually guarantees that its so-called "forward-looking" network will virtually replicate the embedded facility. In addition, the data provided by Verizon in support of its working line counts suggests that the line working line counts used by Verizon to match with the survey data may very well be understated. All other things being equal, understating the number of working lines overstates loop costs.

Q. DOES THE USE OF EXISTING CSA BOUNDARIES INTRODUCE INEFFICIENCIES IN THE VERIZON COST STUDY?

A. Yes. By using existing CSA and DA boundaries Verizon is likely not taking advantage of the efficiencies available with today's DLC technology.

Q. PLEASE EXPLAIN.

A. The smallest size DLC remote terminal ("RT") used in the Verizon study has a 224-line capacity. Many of the DAs in the Verizon service territory contain fewer than 50 lines. Verizon's cost study includes a total of 8,795 DAs for its Virginia service territory. Of these, approximately 1,362, or 15%, have fewer than 50 working lines. Verizon's cost study assumes 1,123 of these fewer than 50-line DAs will be served with 224-line capacity DLC equipment. The average DLC utilization for these 1,123 DAs is a scant ten percent.

Q. COULD THIS BE AVOIDED IN A FORWARD-LOOKING NETWORK?

A. Yes. A more efficient approach would be to regroup DAs based on actual customer locations in order to achieve higher utilization of expensive DLC equipment, thereby reducing overall UNE costs. Unfortunately, the cost studies presented by Verizon do not allow for such consolidation. The line counts by DA are an input to the model that cannot be altered. As a general matter, these inefficiencies cannot be corrected and are carried forward in our restatement of Verizon's loop costs. As a result, despite other adjustments and corrections we propose, Verizon's models cannot be made TELRIC compliant.

Q. YOU MENTIONED THAT VERIZON MAY WELL UNDERSTATE THE NUMBER OF LOOPS IN ITS NETWORK. WHAT IS YOUR BASIS FOR THIS STATEMENT?

A. The loop costs developed within the Verizon LCAM model are based on a total of **[BEGIN VERIZON PROPRIETARY] *** [END VERIZON PROPRIETARY]** working lines. The source of this working line count is not clear from the documentation provided by Verizon. In contrast, the Verizon Loop Analysis Reporting and Tracking ("LART") database identifies a total of **[Begin Verizon Proprietary] *** [End Verizon Proprietary]** working lines in the Verizon Virginia service territory, while the Loop Engineering Assignment Data ("LEAD") database shows a total of **[Begin Verizon Proprietary] *** [End Verizon Proprietary]** working lines.

Q. WHY IS THE NUMBER OF WORKING LINES AN ISSUE IN THE DEVELOPMENT OF FORWARD-LOOKING LOOP COSTS?

A. Because of the economies of scale associated with outside plant investment, the number of lines over which outside plant investment is spread plays a critical role. Generally, the greater the concentration of lines in a given UAA, the lower the average cost per line of cable and outside plant structure (i.e., poles and conduit), because the investment is spread over more lines. By using the lowest of the available counts of working lines, it is likely that Verizon has overstated loop costs by failing to capture all of the available economies of scale that exist today.

Q. ARE YOU ABLE TO ADJUST THE LINE COUNTS IN THE VERIZON COST STUDY TO BETTER REFLECT SUCH ECONOMIES OF SCALE?

A. No. First, it is not clear from the Verizon data which count of working lines is correct. Second, the Oracle interface in which the Verizon cost models are run

does not allow the user to modify the line counts used in the cost models. Thus, any adjustment to reflected added efficiencies must be done outside of the Verizon cost model. However, we have not included any such adjustment in our restatement of Verizon's costs, although such an adjustment seems justified.

B. DIGITAL LOOP CARRIER SYSTEMS

1. UDLC V. IDLC

Q. WHAT ASSUMPTIONS DOES THE VERIZON STUDY MAKE REGARDING DIGITAL LOOP CARRIER INTERFACE?

A. Verizon's two-wire loop costs include a subjective fiber-copper breakpoint above which loops are provisioned with fiber feeder and digital loop carrier technology. Verizon's cost study assumes that 82 percent of loops will use DLC, with approximately 70 percent of those loops provisioned with an integrated interface and the remaining 30 percent provisioned with older and less efficient universal interface.

Q. IS VERIZON'S DLC ASSUMPTION OF 30% UNIVERSAL INTERFACES THE APPROPRIATE FORWARD-LOOKING CONSTRUCT?

A. No. TELRIC requires that Verizon's forward-looking economic costs provide UNEs based upon a least cost, forward-looking network. In this case, least cost, forward-looking technology means an integrated DLC ("IDLC") interface at the DS1 level for those loops exceeding the fiber/copper threshold and provisioned with fiber feeder. It does not mean deploying less efficient analog Universal DLC ("UDLC") interfaces and penalizing CLECs for connecting to Verizon's outdated embedded infrastructure.

Q. WHAT ARE THE DIFFERENCES BETWEEN UDLC AND IDLC?

A. In a UDLC system, analog signals originating from a customer's telephone are converted into a digital signal at a Remote Terminal ("RT") and transported by the digital carrier system to the Central Office Terminal ("COT"). At the COT, the signal is converted from digital to analog and is then terminated on the Main Distribution Frame ("MDF"). Since virtually all switches deployed today are digital, the analog signal from the MDF must be cabled to the Analog Port of the switch, where the signal is converted once again into digital format so that it can be processed by the digital switch. The UDLC system is a less-than-efficient technology for several reasons. The back-to-back digital/analog conversions are inefficient, cumbersome and degrade transmission quality; and this impairment to the channel will increase as advanced modem technology challenges the capability of the network. In addition, the multiple signal conversions require additional line cards and other equipment. Further, there is an increased risk of equipment failure caused by the MDF cross-connect activity.

In stark contrast, in an IDLC system, the analog signal generated at the customer's telephone is converted to digital form at the RT. The digital signal is transported by the digital carrier system to the Central Office and terminated directly to the switch without any need for further conversion. The integration of digital switching and digital transmission facilities in an IDLC System generates substantial operational and equipment savings, including:

- the elimination of digital/analog conversion at the COT;

- the elimination of costs for the extra sets of equipment used in UDLC signal conversion;
- the elimination of labor costs associated with terminating and cabling the MDF;
- reduced risk of potential equipment failure resulting from cross-wiring activity on the MDF; and
- improvement in the overall transmission quality.

Given the efficiencies of the IDLC system, it is ludicrous for Verizon to maintain that a forward-looking network would use the less-than-efficient technology mix of UDLC and IDLC that it proposes.

Q. WITH SUCH OBVIOUS BENEFITS ASSOCIATED WITH IDLC, WHY WOULD UDLC EVEN BE CONSIDERED?

A. UDLC was introduced in the 1970's as a substitution technology for copper feeder cables, since it dramatically reduced the amount of copper feeder pairs deployed in the network. A signal arriving at the Central Office underwent only one conversion (to analog) and terminated on the analog switch via the MDF. Even after the introduction of first generation IDLC in 1980 and the gradual replacement of analog switches with digital switches, UDLC continued to have advantages over IDLC for some types of services. Because in an IDLC system the digital signal terminates directly to the switch, non-switched/non locally switched special services required "grooming" from the IDLC high speed interfaces to the switch. While several alternatives existed, UDLC offered a cost effective way of provisioning services that required grooming in older IDLC systems.

Q. HAS VERIZON PROVIDED ANY CALCULATIONS SUPPORTING ITS SPLIT BETWEEN THE INTEGRATED AND UNIVERSAL INTERFACE?

A. Yes. Verizon claims that the percentage split between the integrated and universal interface is based on what it has been able to install in its embedded network. But Verizon's experience in the embedded network is irrelevant to a forward-looking cost study. The embedded network includes a mix of technologies that has evolved over the years. Some of these older technologies may have capacity limitations or other characteristics that render them unable to accommodate an integrated interface. For example, materials produced by Verizon in discovery reveal that its embedded network still includes an analog switch in the Purcellville wire center. Any DLC equipment installed in the embedded network in the Purcellville wire center would require a universal interface to communicate with the Purcellville switch. In a forward-looking cost study, and even in Verizon's purported forward-looking cost study, the Purcellville wire center, like all other wire centers in Virginia, is provisioned with a new digital switch.

Q. IS VERIZON JUSTIFIED IN MAKING ITS ASSUMPTION OF 30% UDLC?

A. Verizon further contends that UDLC is needed to provision non-switched services and also for unbundling. Neither is correct. We will discuss Verizon's claim with respect to unbundling below, when we discuss the GR303 interface. As for Verizon's claim with respect to non-switched services, it is irrelevant in assessing the costs of two-wire analog loops used to provide switched services. Aside from its unbundling claim, Verizon does not attempt to show that any UDLC is needed

for two-wire analog loops. In addition, Verizon is simply wrong that UDLC cannot be used to provide non-switched services

2. GR303 V TR008 INTERFACES

Q. FOR THOSE LINES ASSUMED BY VERIZON TO BE PROVISIONED WITH INTEGRATED DIGITAL LOOP CARRIER EQUIPMENT, DOES VERIZON EMPLOY THE MOST EFFICIENT INTEGRATED INTERFACE?

A. No. The most efficient, forward-looking Digital Loop Carrier technology currently available is the IDLC system that utilizes a Time Slot Interchanger (TSI) feature and interfaces to the Local Digital Switch (LDS) via the GR-303 interface. Verizon nevertheless assumes that the vast majority of IDLC will be provisioned with an older, less efficient TR-008 interface, and that only a small percentage (10 percent of all loops) will use the state-of-the-art GR-303 interface. The TSI feature allows the "pathing" of any circuit in the RT to appear on any DS1 interface group in the Central Office. This feature enables the grooming of non-switched/special services, as well as the unbundling of circuits. The GR-303 interface allows concentration by assigning on a "per call basis," rather than using numerous dedicated channels.

Q. WHY IS GR-303 THE MOST EFFICIENT FORWARD-LOOKING INTERFACE?

A. GR-303 assigns a path to the Central Office on a "per call basis," rather than dedicating a channel for each line as is required under TR008 technology. This allows substantially fewer facilities to be provisioned under GR-303, a feature

knows as concentration.[13] Concentration reduces the number of transport DS1 cards, decreases the number of switch ports, and spreads the cost of the peripherals over a greater number of lines. Moreover, a concentrated GR-303 system provides a lower cost ISDN interface. If ISDN is provided by GR-303, 66% of the line cards that would otherwise be used can be eliminated and only one DS0 is required for every four ISDN D Channels.

Q. CAN YOU FURTHER EXPLAIN THE ADVANTAGES OF GR-303 AS COMPARED TO TR008?

A. Modern switching systems are typically designed to be traffic limited, rather than port limited. This design allows for the cost effective sharing of costly switch resources and strives to carefully balance service quality and the cost of associated switch infrastructure. The design of integrated (TR008 and GR-303) switch peripherals and the allocation of switching fabric to those peripherals, begins with an assumption of offered traffic load. A design is required to meet the service quality requirements of that traffic load. If that traffic design understates the true traffic requirements of the architecture, service quality will likely deteriorate. If the design overstates the traffic requirements, poor equipment utilization will result. TR008 integrated designs implement concentration within the switch, between the peripheral and the switching fabric. No concentration typically takes place on the digital loop carrier system. During the most extreme traffic overloads, switch blockage could occur when the traffic offered to the peripheral

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[13] *See* Verizon Cost Panel Testimony at 91.

exceeds the capacity of the available switching fabric. Although the TR008 interface would still have many available idle channels, they may not be effective in making or receiving calls.

The GR-303 architecture offers the opportunity to more closely match the traffic capacity of the loop transport system and the line port requirements of the switch to the designed traffic capacity of the switch. GR-303 Interface groups are generally larger than TR008 Interface Groups and, therefore, will be less susceptible to traffic load variations. Each line within the large GR-303 Interface Group will have access to all of the traffic bearing channels within the interface.

Q. VERIZON CLAIMS THAT IDLC IS NOT COST EFFECTIVE, AND THAT UDLC/COPPER LOOPS ARE THE MOST EFFICIENT TECHNOLOGIES FOR UNBUNDLING LOOPS. DO YOU AGREE?

A. No. GR-303 IDLC is substantially less costly than UDLC, deploys fewer facilities (concentration), is more efficient in its use of switch ports, DS1 cards and ISDN provisioning, and is capable of unbundling and grooming circuits via remotely provided OSS instructions. UDLC is 1970's technology, while copper loop alternatives even pre-date UDLC. These technologies hardly qualify as forward-looking for TELRIC purposes.

Q. ON WHAT BASIS DOES VERIZON INCLUDE ONLY MINIMAL AMOUNTS OF GR-303 DLC TECHNOLOGY IN THE FORWARD-LOOKING NETWORK?

A. Verizon's reason for using only small amounts of GR-303 IDLC interfaces is that most of the digital switches currently employed in Verizon's embedded network

are TR-008 compatible and not GR-303 compatible.[14] Verizon claims that it has no plans to change its embedded switch interface compatibility in the foreseeable future, and thus concludes that a GR-303 interface is not appropriate. Verizon's position is a perfect example of developing "forward-looking" costs based on the older technologies and inherent inefficiencies within its embedded network. Verizon disregards the fact that the SCIS model it uses to develop forward-looking switching costs assumes the placement of all new digital switches. The decision of the appropriate interface compatibility for these new switches is therefore not a backward-looking one as Verizon suggests, but rather a forward-looking one. In this case, the least cost, forward-looking decision is to make these new switches GR-303 compatible.

Network-wide GR303 deployment in a forward-looking study is also consistent with Verizon's own deployment guidelines. **[BEGIN VERIZON PROPRIETARY] *** [END VERIZON PROPRIETARY]** Nonetheless, instead of following its own growth guidelines, Verizon retreats to a position that would essentially replicate its embedded plant.

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[14] *See* Verizon Cost Panel Testimony at 103, Lines 3-12.

Q. ARE VERIZON'S ASSUMPTIONS REGARDING THE TYPE OF DIGITAL LOOP CARRIER INTERFACE THE SAME AS ITS ASSUMPTIONS IN THE FIRST UNE PRICING PROCEEDING?[15]

A. No. When the initial cost studies were performed in 1997, all parties, including Verizon (then Bell Atlantic), agreed that IDLC equipment would be the lowest cost, most efficient means to provision service. In 1997, however, the prices for IDLC equipment with a next generation GR-303 interface that was capable of being unbundled for the provisioning of UNE's had not yet been firmly established. Instead, Verizon developed a surrogate price based in part on the older, more expensive, UDLC equipment that Verizon had previously been deploying.

Q. CAN THE "GROOMING" OF NON-SWITCHED/NON-LOCALLY SWITCHED SPECIAL SERVICES BE ACCOMPLISHED TODAY IN A COST EFFECTIVE MANNER?

A. Yes. With the advent of TSI in the 1990's, grooming of circuits provisioned at a Remote Terminal can be achieved via a software command. New provisioning OSSs can communicate directly with the DLC. The DLC takes these remote provisioning instructions, makes the internal cross connections without human intervention, and assigns a slot (*e.g.*, a distinct path or channel that digital signals follow between DLC devices). Simply put, TSI is a form of computerized cross connections. Thus, contrary to the contention of the Verizon cost panel,[16] UDLC

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[15] *See* Ex. Parte: To Determine Prices Bell Atlantic-Virginia, Inc. is Authorized to Charge Competitive Local Exchange Carriers, PUC970005 (April 15, 1999).

[16] *See* Verizon Cost Panel Testimony at 26, 93.

is no longer needed – or efficient – for the provisioning of non-switched services or data services like ISDN and DDS.

Q. CAN EFFICIENT, IDLC LOOPS BE HANDED OFF TO CLECS?

A. Yes. Such loops are handed off to CLECs via a DS1 interface. The issue is the type of tie cable arrangement that a CLEC makes via collocation in the central office. Efficient connection would be at the DS1 level via a tie cable from the DSX frame to the CLEC Point of Presence, rather that at the DS0 level from the MDF to the CLEC Point of Presence. Presently deployed IDLC systems have a feature known as virtual interface groups. Virtual interface groups were originally designed to more efficiently balance the load on the switch by permitting the rearrangement of circuits from the RT to the Host switch interface. However, the same technology can be used to unbundle loops provisioned to the host switch by simply rearranging the circuit to an interface group of a different host switch. The process control to effect such unbundling ultimately resides in the SWITCH-DLE system with links to SOAC, LFACS, FOMS, TIRKS, FEPS, OSP/INE, NSDB, WFA/C, NMA, MARCH AND PVI.

Indeed, even in its testimony here, the Verizon cost panel concedes that it is "hypothetically possible to support unbundling of individual loops using the GR-303 interface." [17]

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[17] Verizon Cost Panel Testimony at 94.

Q. DO YOU AGREE WITH VERIZON THAT ABSENCE OF WORKING OSS MAKES IT INAPPROPRIATE TO ASSUME GR-303 UNBUNDLING IN A FORWARD-LOOKING NETWORK?

A. No. Although Verizon tries to hide behind its claim that the Operations Support Systems ("OSS") has not yet been developed to effectively permit unbundling of GR-303,[18] that argument confuses issues related to provisioning GR-303 in the existing network with a forward-looking scenario in which OSS will be specifically designed to work efficiently with the GR-303 interface. The absence of appropriate OSS is no different than the problems that existed when the Act was first implemented and it was technically feasible to unbundle a loop or port but the OSS to do so did not yet exist. To date, the LECs have had little incentive to work with vendors to develop the OSS for GR-303 unbundling. But there is no doubt that a carrier designing a forward-looking network would use GR-303 and would work with vendors to put in place the OSS needed to unbundle the GR-303. It would not be technically difficult to develop such OSS if the BOCs desired to do so. For example, at present, the BOCs have not assigned unique three digit codes to different carriers as would be necessary but creating such codes is not difficult. Finally, it is important to note that even if it is not possible to place an electronic flow-through order for unbundling today, there is no technical issue involved with placing such an order manually.

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[18] *See* Verizon Cost Panel Testimony at 93.